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Positivity bounds on vector boson scattering

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Weak vector boson scattering (VBS) is a sensitive probe of new physics effects in the electroweak symmetry breaking. Currently, experimental results at the LHC are interpreted in the effective field theory approach, where possible deviations from the Standard Model in the quartic-gauge-boson couplings are often described by 18 dimension-8 operators. By assuming that a UV completion exists, we derive a new set of theoretical constraints on the coefficients of these operators, i.e. certain combinations of coefficients must be positive. These constraints imply that the current effective approach to VBS has a large redundancy: only about 2% of the full parameter space leads to a UV completion. By excluding the remaining unphysical region of the parameter space, these constraints provide guidance for future VBS studies and measurements.

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